

PART II – POLICY AND STANDARDS

CHAPTER 14

UTILITIES INSTALLATION IN PUBLIC SPACE

14.1 General Requirements

Coordinate the design for new construction with affected utility companies in early stages of the design. Every effort should be made to avoid relocations of the existing utilities unless it is deemed necessary to relocate them. The cost for relocating the existing utilities will be borne by the affected utility companies except the utilities relocated on the Interstate Highway System, where Federal Highway Administration will participate in the relocation cost.

14.1.1 Minimum Depth

All utilities shall be installed at a minimum depth of 36 in. from the top of the pipe to the top of pavement or 24 in. from the top of pipe to the top of sub-grade, whichever is greater.

14.1.2 Access Covers

- Clearance - All manhole lids, utility access covers, and range box access covers shall be depressed no more than 1/2 in. below the adjacent finished street surface. If located in concrete, all access covers shall be set flush with surrounding concrete.
- Wheel Path - Manholes or valves shall not be constructed in the Wheel Path of the travel lane or at any location within a bike lane.

14.1.3 Trees and Large Shrubs Near Utilities

- Buried Utilities - Trees, berms or large shrubs shall not be placed over buried utilities. Horizontal clearances from the trunk of any tree or shrub to any buried utility will be at least 3 ft., unless an exception is granted by the utility company.
- Overhead Utilities - Trees should not be planted under overhead power lines when mature growth of the tree would come within 10 ft. of the power lines.

14.1.4 Conduits and Sleeves

Utility companies shall install all utilities in non-corrosive conduits or sleeves equivalent to Schedule 40 PVC meeting the requirements of the utility companies or other conduits and sleeves encased in concrete, slurry or flow-fill material, on all public streets to minimize future repairs and street cuts. Exception will be the gas lines that shall have metal pipes meeting the requirements of the utility company.

14.2 Location Criteria

14.2.1 General

Utilities shall be installed outside the curbs and gutters. They shall be separated at least 2 ft. from the existing buried utilities. When 24 in. clear space is not available, the matter must be conferred with the affected utility for their concurrence.

14.2.2 Water

- Water Mains - Water mains should be located on the north and east sides of streets approximately 7 ft. south or west of the north or east flow line. Water mains shall be separated by a minimum of 10 ft. horizontally from sanitary sewer and storm sewer facilities.
- Fire Hydrants - Fire hydrants shall be located 2 ft. minimum from back curb or 1.5 ft. minimum from back edge of a sidewalk or 10 ft. minimum from edge of pavement if no curb is present. In addition, the water line shall be located such that the valves will not be in the wheel path of the street lane.
- If the water line is located where reconstruction is done, Water and Sewer Authority (WASA) must be notified. WASA will then look at how old the existing water line is and determine if it needs to be replaced.

14.2.3 Sanitary Sewer

Sanitary sewer should be on the centerline of the ROW unless a median is present. If a median is present, the sanitary sewer line shall be located 6 ft. west or south of the median. The sanitary sewer shall be located such that the manhole locations are not within the wheel path of the street lane.

14.2.4 Storm Sewer

The storm sewer shall be placed so the manhole locations are not within the wheel path of the street lane.

14.2.5 Natural Gas

Gas mains shall be located either within the ROW or in an adjacent easement on the south and west sides of the street.

14.2.6 Power and Street Lighting

Generally, power and street lighting lines shall be located on both sides of the street either within the ROW or in an adjacent easement.

14.3 Other Utilities

Cable TV and telephone lines generally serve properties from the back. The utility companies shall coordinate the locations of their installations in the ROW or easements with the District and other utility companies.

14.3.1 Traffic Signals and Signs

- Location - Poles, signs and any other above ground streetscape (except regulatory signs) should be located within 5 ft. of the ROW line or 10 ft. from the travel lane (flow-line), whichever is most restrictive.
- Clearance - Light poles shall be placed no closer to the roadway than 2 ft. behind a vertical curb line and no closer than 2 ft. to any sidewalk.
- The Traffic Engineer may require breakaway poles on public ROW where speed limit is 40 Mph or higher.
- Other Requirements - All signs and heights shall meet the requirements of the **Traffic Signal Design** chapter within this manual.

14.4 Utilities Attachments on Bridge

14.4.1 General

The following guidance in regard to utility installations on bridges should be followed:

- In most cases, attachment of utility facilities to highway structures, such as bridges, is a practical arrangement and considered to be in the public interest. However, every effort should be made when attaching utility lines to a highway structure so that they do not affect the structural integrity, the safe operation of traffic, the efficiency of maintenance as well as the appearance.
- Since highway structure designs and site conditions vary, the adoption of a standard method to accommodate utility facilities is not feasible; however, the method employed should conform to logical engineering considerations for preserving the highway, its safe operation, maintenance and appearance. Generally, acceptable utility installations

are those that will occupy a position beneath the structure's floor, between the outer girders, beams or within a cell, and at an elevation above low superstructure steel or masonry.

- The general controls for providing encasement, allied mechanical protection and shut-off valves to pipeline crossings of highways and for restriction against varied use shall be followed for pipeline attachments to bridge structures, except that sleeves are required only through the abutment backwalls. Where a pipeline attachment to a bridge is encased, the casing should be effectively opened or vented at each end to prevent possible buildup of pressure and to detect leakage of gases or fluid.
- Since an encasement is not normally provided for a pipeline attachment to a bridge, additional protective measures shall be taken. Such measures shall employ higher factor of safety in the design, construction, and testing of the pipeline than would normally be required for cased construction.
- Communication and electric power line attachments shall be suitably insulated, grounded, and carried in protective conduit or pipe from the point of exit from the ground to re-entry. The cable shall be carried to a manhole located beyond the backwall of the structure. Carrier pipe and casing pipe should be suitably insulated from electric power line attachments.
- Guy wires in support of any utility will never be allowed to attach to a bridge structure.

To insure that the function, aesthetics, painting and inspection of stringers of a structure are maintained, the following applies to the installation of utilities on structures:

- Permanent installations, which are to be carried on and parallel to the longitudinal axis of the structure, shall be placed out of sight, between the fascia beams and above the bottom flanges, on the underside of the structure.
- Conglomeration of utilities in the same bay shall be avoided in order to facilitate maintenance painting and future inspection of steel stringers in a practical manner.

14.4.2 Supports

Due consideration shall be given to the weight of the pipes, ducts, etc. in the design of the beams and diaphragms. Utilities shall not be supported by a system that requires inserts in the concrete deck slab. They shall be supported directly on structural beams. Also, utilities shall not be supported by a system that requires drilling into prestressed concrete beams. Welding onto structural steel beams or diaphragms is not permitted.

The support details shall be in accordance with the requirements of the individual utility companies

- The location of a utility crossing in a structure should be selected to avoid conflict with existing utilities or future utilities for which provisions have been made. Adequate access for maintenance and inspection of the planned installation and of the structure itself must be kept in mind.
- Placement of utilities on bridge decks or sidewalk areas, or attachments to railings or parapets, are not permitted. Also prohibited are exposed installations at the outside faces of the structure.
- Existing under-clearances must be preserved. The applicant must position all elements of a crossing to clear a line defined by connecting the points of intersection of the centerline of web at the bottom of the bottom flange beams flanking the installation.
- Familiarity with the structural framework is necessary to avoid conflicts with bearing seats, cross frames, intermediate and end diaphragms and lateral bracing.
- Structural integrity of the bridge components shall be preserved. The dead load of the proposed utility attachment shall not be accounted for in bridge design.

14.4.3 Plans and Installation Requirements

General Plan and Elevation drawings shall show information about all existing and proposed utilities carried under the superstructure or in the vicinity of foundations. Complete information as to the name of owner, size, type, abandonment, proposed relocation, and material to be furnished by utility company, etc. shall be noted.

- Joints in bridge decks unusually define locations where differential movements can occur between adjacent spans resulting from temperature changes and traffic loads. Appropriate devices must be provided at these locations to accommodate similar movements in bridge attachments.
- Galvanized structural steel should be utilized for supports where existing structural elements cannot be used to carry loads. Sizes of proposed structural shapes should be provided.
- Specify the type, size and location of connections. High strength bolts (M22 preferred) shall be used. For new structures, welding to existing structural appurtenances is prohibited. Welding or drilling on steel structures in the field is also prohibited. The locations and details of all connections must be designated by the bridge Designer. Placement of anchor bolts or other inserts into deck slabs is also prohibited.
- Pipes installed through abutment back-walls should be placed in galvanized steel sleeves set in non-shrink grout with the opening

between the pipe and sleeve packed with jute or similar material to prevent leakage through the back-wall.

- Provide ducts for electrical and communication cables.
- Pipes carrying liquids under pressure in trenches should be sleeved within 10 ft. of abutments, walls and piers.
- All pipelines carrying liquids or gasses under pressure shall extend through the supporting structure without changes in alignment. Changes in alignment shall be outside the structure limits. Reactions developed at these locations should be carried by thrust blocks or other means completely independent of the bridge's structural elements.
- Provide a plan view with a North reference arrow, an elevation and a cross section of the structure and detailing and necessary dimensions to identify and locate existing and proposed structural members that are in relationship to the bridge attachment and to verify clearances. Additional sections should be shown, as required, to completely convey the extent of the work and/or modifications proposed.
- The outside diameters and thickness of pipes, and weights of pipe or conduit and materials carried should be shown on the plans. If manufactured fittings, connectors, supports, etc. are used, their identity and spacing should be indicated on the plans and catalog cuts with dimensions should be traced on to the plans.

14.4.4 Pipeline Expansion Joints (Water Mains)

- Allowances must be made for changes in pipe length due to thermal expansion and alternate contraction. While Dresser type couplings will take care of the normal amount of expansion and contraction in each length of pipe, Dresser type expansion joints are required where no flexible joints are used in the pipeline or when the amount of concentrated movement at one point is in excess of the amount that can be safely absorbed by the standard coupling.
- A Dresser type expansion joint should be located in the pipeline adjacent to every point where expansion means are provided in the superstructure.
- Use Dresser type couplings to accommodate the differential movement between the structure and the line itself, and to provide flexibility to accommodate vibrations of the structure.
- Each coupling can safely accommodate up to 3/8 in. longitudinal movement. This is equivalent to the amount of movement resulting from a 150°F temperature variation in a 40 ft. length of steel pipe.
- Proper alignment is important to insure free and concentric movement of the slip-type expansion joint. Alignment guides should be designed to allow free movement in only one direction along the axis of the pipe and to prevent any horizontal or vertical movement of the pipe. Suitable pipe alignment guides may be obtained from reliable pipe

alignment guide manufacturers. Alignment guides should be fastened to some rigid part of the installation, such as the framework of the bridge. Alignment guides should be located as close to the expansion joint as possible, up to a maximum of 4 pipe diameters. The distance from the first pipe guide to the second should not exceed a maximum of 14 pipe diameters from the first guide. Where an anchor is located adjacent to an expansion joint, it too should be located as close to the expansion joint as possible, to a maximum of 4 pipe diameters from the expansion joint. Additional pipe supports are usually required. It must be kept in mind that pipe supports should not be substituted for alignment guides. The main pipe anchors must be designed to withstand the full thrust resulting from internal line pressure; also, the force required to collapse the slip pipe, and the frictional forces due to guides and supports.